WHAT IS CLAIMED:

1. A diagnostic system for a three phase electric motor comprising:

a first subsystem to determine current in each motor phase;

a second subsystem to generate a first estimate of motor shaft position;

a third subsystem to generate a first estimate of motor torque using the first subsystem to determine current in each motor phase and the first estimate of motor shaft position;

a fourth subsystem to determine current in each motor phase;

a fifth subsystem to generate a second estimate of motor shaft position;

a sixth subsystem to generate a second estimate of motor torque using the fourth subsystem to determine current in each motor phase and the second estimate of motor shaft position; and

a comparator system to compare the first and second estimates of motor torque.

2. The diagnostic system according to claim 1, further comprising an operator notification system.

3. The diagnostic system according to claim 1, wherein the first subsystem to determine current in each motor phase comprises:

a first current sensor generating a first measured current of a first phase of the electric motor;

a second current sensor generating a first measured current of a second phase of the electric motor; and

a current generator system to generate a first estimated current of a third phase of the electric motor based on the first measured current in the first phase and the first measured current of the second phase.

4. The diagnostic system according to claim 1, wherein the second subsystem to generate the first estimate of motor shaft position is a first Kalman filter.

5. The diagnostic system according to claim 1, wherein the fourth subsystem to determine current in each motor phase comprises:

a third current sensor generating a second measured current of a first phase of the electric motor;

a fourth current sensor generating a second measured current of a second phase of the electric motor; and

a second current generator system to generate a second estimated current of a third phase of the electric motor based on the second measured current of the first phase and the second measured current of the second phase.

6. The diagnostic system according to claim 1, wherein the fourth subsystem to determine current in each motor phase comprises:

a third current sensor generating a second measured current of a first phase of the electric motor;

a fourth current sensor generating a first measured current of a third phase of the electric motor; and

a system to generate an estimated current of the second phase of the electric motor based on the second measured current of the first phase and the first measured current of the third phase.

7. The diagnostic system according to claim 4 wherein the sixth subsystem to generate the second estimate of motor shaft position is a second Kalman filter.

8. The diagnostic system of claim 1 wherein the fifth subsystem to generate the second estimate of motor shaft position is a resolver.

9. A method to diagnose potential discrepancies in electrical operating characteristics in a three phase electric motor comprising the steps of:

determining current in each motor phase with a first system;

generating a first estimate of motor shaft position;

generating a first estimate of motor torque using the first system to determine current in each motor phase and the first estimate of motor shaft position;

determining current of each motor phase with a second system;

generating a second estimate of motor shaft position;

generating a second estimate of motor torque using the second system to determine current in each motor phase and the second estimate of motor shaft position; and comparing the first and second estimates of motor torque.

10. The method according to claim 9, further comprising the step of notifying a motor operator of a potential discrepancy in electrical operating characteristics.

11. The method according to claim 9, wherein the step of determining current of each motor phase with the first system comprises:

generating a first measured current of a first phase of the electric motor with a first current sensor;

generating a first measured current of a second phase of the electric motor with a second current sensor; and

generating a first estimated current of current in a third phase of the electric motor based on the first measured current of the first phase and the first measured current of the second phase.

12. The method according to claim 9, wherein the step of generating the estimate of motor shaft position is accomplished by using a first Kalman filter.

13. The method according to claim 9, wherein the step of determining current in each motor phase with the second system comprises:

generating a second measured current of a first phase of the electric motor with a third current sensor;

generating a second measured current of a second phase of the electric motor with a fourth current sensor; and

generating a second estimated current of current of a third phase of the electric motor based on the second measured current of the first phase and the second measured current of the second phase.

14. The method according to claim 9, wherein the step of determining current in each motor phase with the second system comprises:

generating a second measured current of a first phase of the electric motor with a third current sensor;

generating a first measured current of a third phase of the electric motor with a fourth current sensor; and

generating an estimated current of current of the second phase of the electric motor based on the second measured current of the first phase and the first measured current of the third phase.

15. The method according to claim 12, wherein the step of generating the second estimate of motor shaft position is accomplished by using a second Kalman filter.

16. The method according to claim 9, wherein the step of generating a second estimate of motor shaft position is accomplished by using a resolver.

17. A system for diagnosing potential discrepancies in electrical operating characteristics in a three phase electric motor comprising:

a controller; and

a control system embodied within the controller for directing the controller to control the steps of determining current in each motor phase with a first system, generating a first estimate of motor shaft position, generating a first estimate of motor torque using the first system to determine current in each motor phase and the first estimate of motor shaft position, determining current in each motor phase with a second system, generating a second estimate of motor shaft position, generating a second estimate of motor torque using the second system to determine current in each motor phase and the second estimate of motor shaft position, comparing the first and

second estimates of motor torque for discrepancies, and notifying a motorist of a potential discrepancy in electrical operating characteristics.

18. An automotive vehicle comprising:

a three phase electric motor;

a controller; and

a control system embodied within the controller for directing the controller to control the steps of determining current in each motor phase with a first system, generating a first estimate of motor shaft position, generating a first estimate of motor torque using the first system to determine current in each motor phase and the first estimate of motor shaft position, determining current in each motor phase with a second system, generating a second estimate of motor shaft position, generating a second estimate of motor torque using the second system to determine current in each motor phase and the second estimate of motor shaft position, comparing the first and second estimates of motor torque for discrepancies, and notifying a motorist of potential discrepancies in electrical operating characteristics.